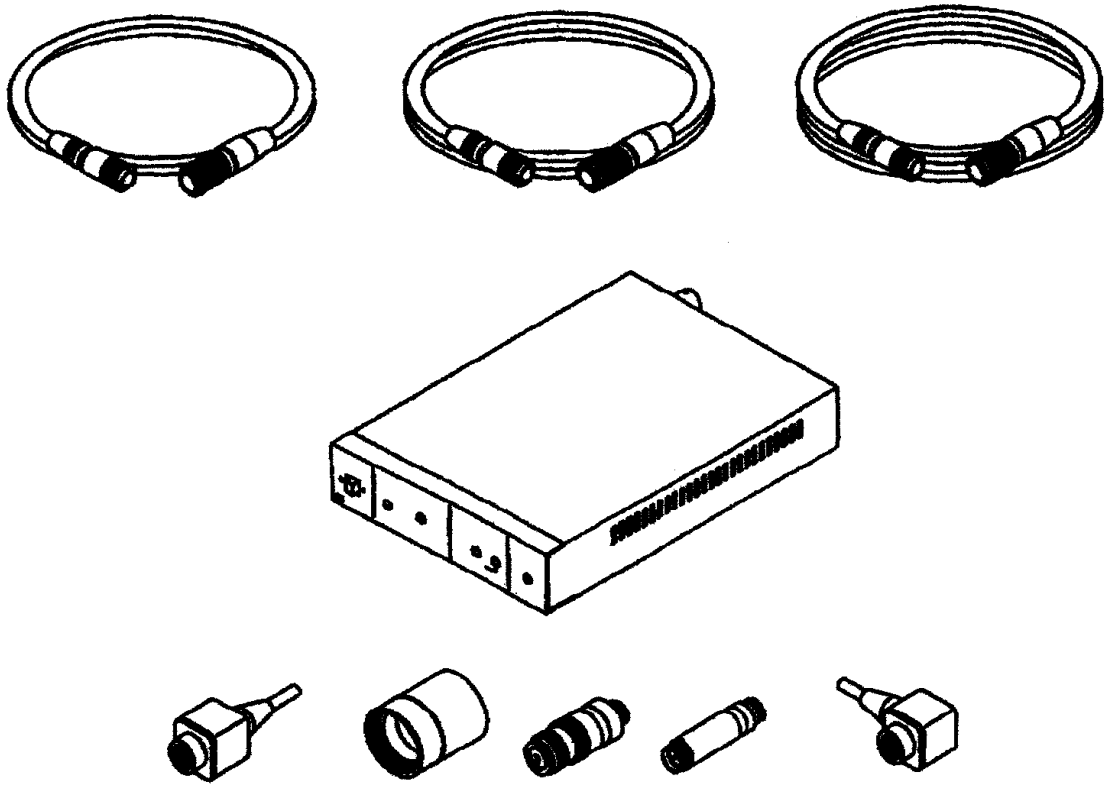
CCD B/W CAMERA
CS4000 SERIES
OPERATION MANUAL



For Customer Use:

Enter below the Serial No. which is located on the rear panel of the camera control unit.

Retain this information for future reference,

Model name. _____

Serial No. _____

TOKYO ELECTRONIC INDUSTRY CO.,LTD.

1. FEATURES

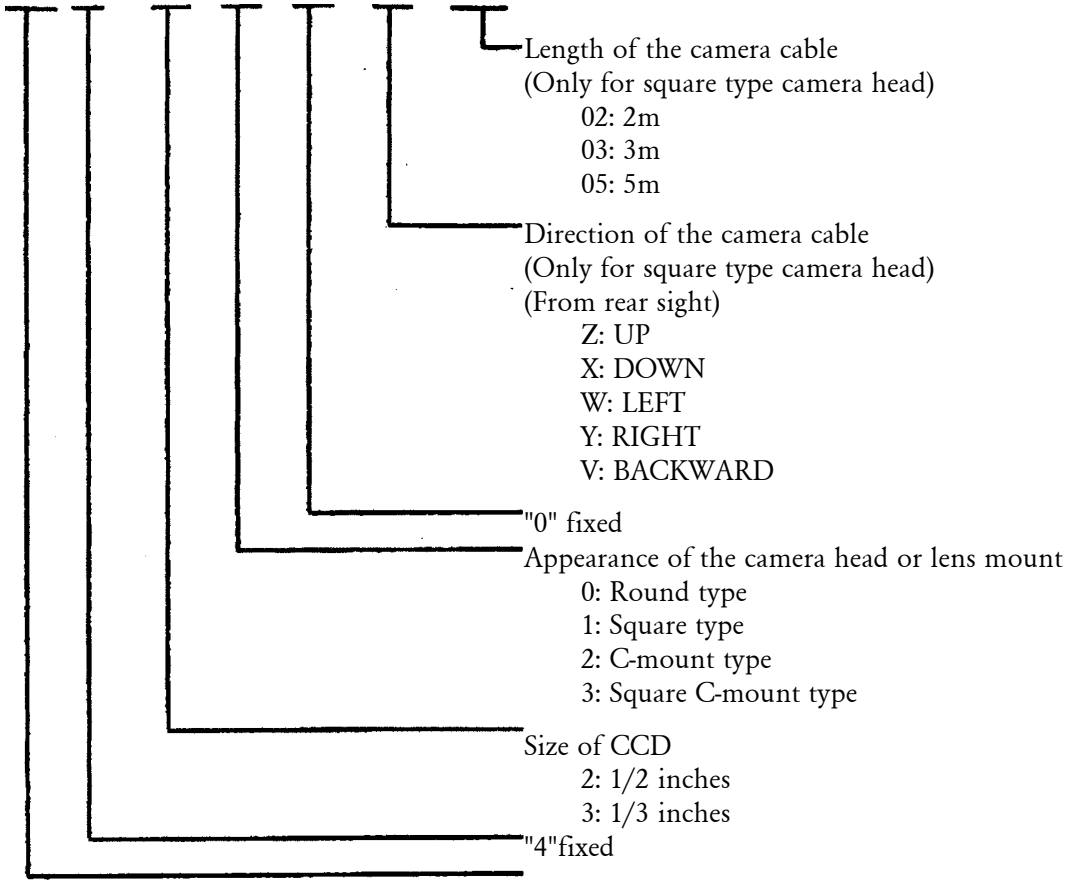
(1) Compact and light weight camera head.
(2) Equipped with AGC (Automatic Gain Control) which allows wide dynamic range from bright to dark subjects.
(3) Equipped with RTS (Random Trigger Shutter) which allows free timing capture with stable SYNC.
(4) Available external SYNC (HD/VD, YS, SYNC) operation.

2. PRECAUTION

(1) This equipment should be used with DC12V only.
To prevent electric shocks and fire hazards, do not use any other power source.
(2) The CS4000 series are designed to be used with EIA B/W television signals.
It cannot be used for playback with a television of a different standard.
(3) Please handle the equipment carefully.
(4) Do not point your camera lens directly into sunlight or strong artificial light.
This might cause irreparable damage to the image sensor.
Also, be sure to use the lens cap when the camera is not in use.
(5) Do not expose the camera unit to high temperatures. For example, do not place it near a stove for long periods, or in direct sunshine or in a car in hot weather. Heat may cause some malfunction.
(6) Keep the camera clean. Dust can damage the camera and cause trouble in moving parts.
Take particular care to avoid the entry of sand or grit when changing the camera lens.
(7) Avoid jolting the equipment or exposing it to vibration.
(8) Never attempt to dismantle the equipment.
(9) Avoid folding or stretching the camera cable or other connection cable between equipment.
(10) When the cabinet is dusty, clean by gently wiping with a soft cloth And avoid the use of strong cleaning agents such as benzene or alcohol as they may damage the cabinet.

3. NAMING OF THIES PRODUCTS

(Example) CS 4 3 1 0 V -01



4. CONSTITUTION

The constitution (the combinations of the camera head and the camera cable) is as following.

Camera head					Camera cable
Type name	Size of the CCD	Appearance	Lens mount	Appearance of the camera head	
CSH4200	1/2 inches	Ø 17mm	M15.5 P0.5 (male screw)	Round type	2m: (CPRC4000-02) (CPRC4100-02) 3m: (CPRC4000-03) (CPC4100-03) 5m: (CPRC4000-05) (CPC4100-05)
CSH4220	1/2 inches	Ø 29mm	C-mount	Round type	
CSH4300	Winches	Ø 12mm	M10.5 P0.5 (male screw)	Round type	
CSH4230V-☐☐	1/2 inches	30 X 30mm	C-mount	Square type	☐☐:Cable length (1) 02: 2m (2) 03: 3m (3) 05: 5m
CSH4230W-☐☐	1/2 inches	30 X 30mm	C-mount	Square type	
CSH4230X-☐☐	1 /2 inches	30 x 30mm	C-mount	Square type	
CSH4230Y-☐☐	1/2 inches	30 X 30mm	C-mount	Square type	
CSH4230Z-☐☐	1/2 inches	30 x 30mm	C-mount	Square type	
CSH4310V-☐☐	1/3inches	20 X 20mm	M10.5 P0.5 (female screw)	Squaw type	
CSH4310W-☐☐	1/3inches	20 x 20mm	M10.5 P0.5 (female screw)	Square type	
CSH4310X-☐☐	1/3inches	20 X 20mm	M10.5 P0.5 (female screw)	Sq	
CSH4310Y-☐☐	1/3inches	20 X 20mm	M10.5 P0.5 (female screw)	Sq	
CSH431OZ-☐☐	1/3inches	20 x 20mm	M14.5 P0.5 (fee screw)	Square t)"	

STANDARD CONSTITUTION

(1) Camera head (without lens) with head cover 1 pc
(2) Camera cable 2 m/3m/5m (Optional) 1 pc
(3) Camera control unit 1 pc
(4) Provided accessories
① Operation manual 1 pc
② Screws to fix a lens 1 or 2 pc
(Only for square type camera head and CSH4220)

5. OPTIONAL ACCESSORIES

Purchase the following optional accessories depending on your system as necessary.

(1) Cable for power supply

(2) Connector for power input

(3) Camera lead mounting kit

(4) C-mount adapter

(5) Lens

Focal length & Aperture (Iris)	f=4 mm,	F 2.2
	f=7.5 mm,	F 1.6
	f=15 mm,	F 2.0
	f=24 mm,	F 3.6

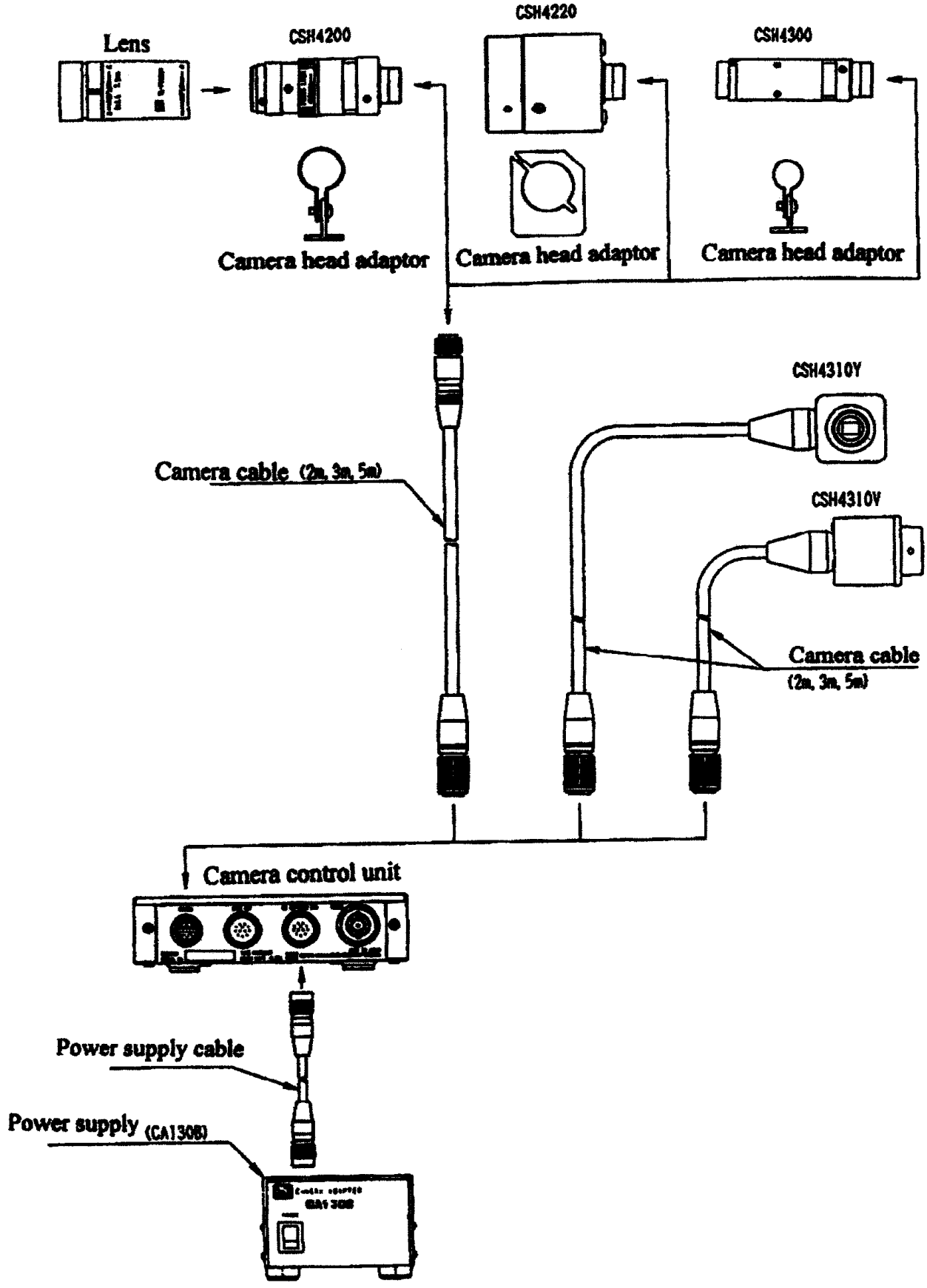
(6) SYNC OUT cable

(7) BNC video cable

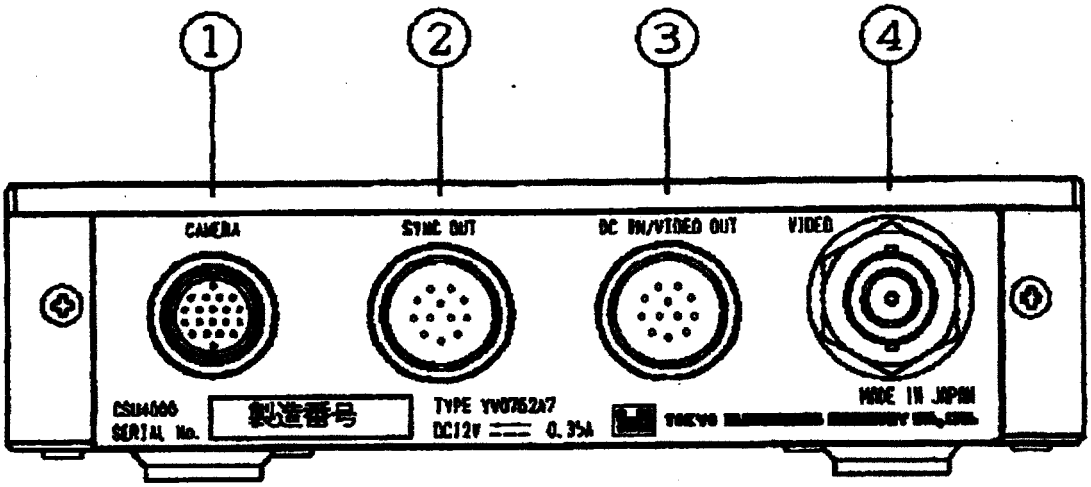
6. CONNECTIONS

When install the CS4000 series camera to your system, you have to connect between equipment.

(1) Typical connection (One example)



(2) Rear panel of the camera control unit



① [CAMERA] connector

This connector is used to connect the camera head and the camera control unit with the camera cable.

When insert the connector, please confirm the position of the guide and screw up tightly.

If it is loose, it may cause some noise.

② [SYNC OUT] connector

(1) Pulse outputs

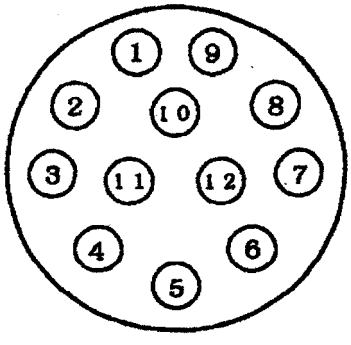
Use them when other equipment required pulses (HD, VD, and SYNC) to be synchronized with the camera. When the external sync-operation, the pulse
of HD, VD and SYNC are regenerated inside of the camera control unit and are output to each pins as followings. When no pulses from outside (at the internal sync-operation) , HD,VD and SYNC generated inside are come out.

(2) Trigger input

When required random trigger shutter operation between other equipment input RTS pulse from pin number 1. And short pin number 2 to pin number 4 or set the shutter switch on the front panel to " RDM ".
Then index pulse to be synchronized with video signal is output to pin number 3 . (Refer to Timing Chart)

① TRIG INPUT
② MODE SELECT
③ INDEX OUTPUT
④ GND
⑤ VIDEO OUTPUT
⑥ GND(VIDEO)
⑦ SYNC OUTPUT
⑧ GND(SYNC)
⑨ HD OUTPUT
⑩ GND(HD)
⑪ VD OUTPUT
⑫ GND(VD)

The alignment of the receptacle dip posts



12 terminals (female) (rear view)

③ [DC IN / VIDEO OUT] connector

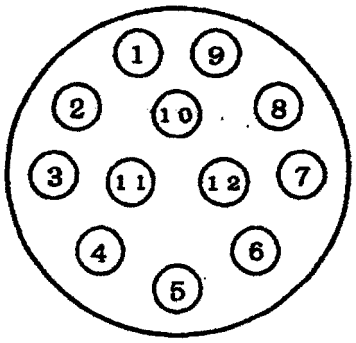
(1) DC12V input
Connect pin number 2 and / or 11 for DC12V (HOT) and pin number 1 and / or 10 for GND.

(2) Video output
Composite EIA video output (VS) is output from pin number 4(HOT) and pin number 3(GND).

(3) Input pulses for external sync
When required external sync-operation between other equipment, use either one of pulse for HD/VD, VS or SYNC. And input HD pulse form pin number 6-5 (GND) and VD from pin number 7-8 (GND) for HD / VD external sync-operation.
And input VS or SYNC from pin number 9-8(GND) for external sync operation by VS or SYNC.

① GND
② DC 12V INPUT
③ GND(VIDEO)
④ VIDEO OUTPUT
⑤ GND
⑥ HD INPUT
⑦ VD INPUT
⑧ GND(VD)
⑨ VS(SYNC) INPUT
⑩ GND(VS)
⑪ DC12VINPUT
⑫ GND

The alignment of the receptable dip



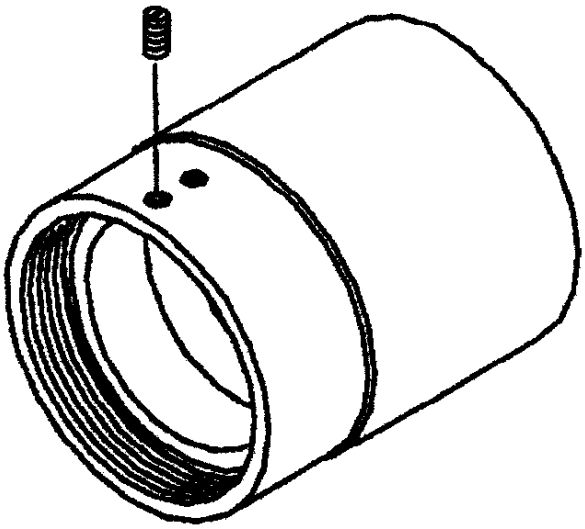
12 terminals (male) (rear view)

④ [VIDEO] connector
Composite EIA video output(VS) is come out from this connector which is employed BNC type.

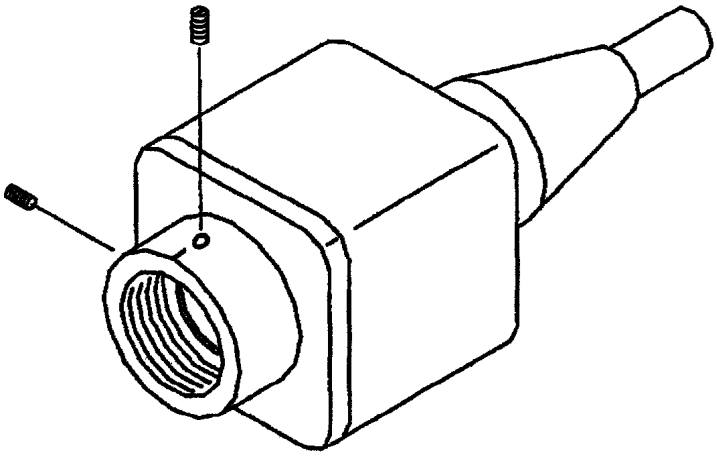
(3) How to fix a lens to this camera head

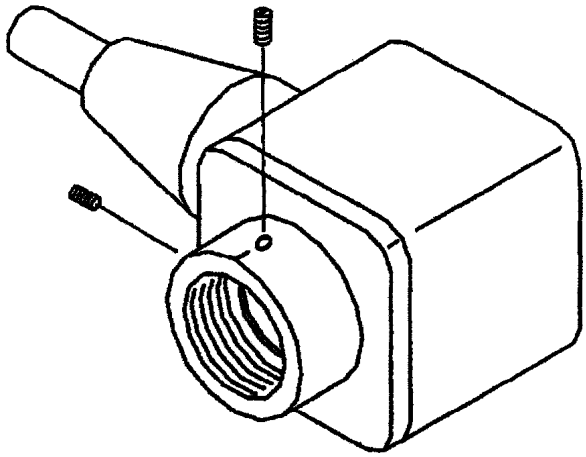
To prevent loosing of the lens from the camera head because of some vibration or shock, fix the lens to this camera head with screw tightly. The screw is provided with this camera head.

① C-mount type



② Square type camera head





7. CONTROLS AND ADJUSTMENTS

Get to know the name and function of every part of this camera.
That way, you can take advantage of every application to take beautiful pictures.

(1) Lens

* Lens is an optional accessory.

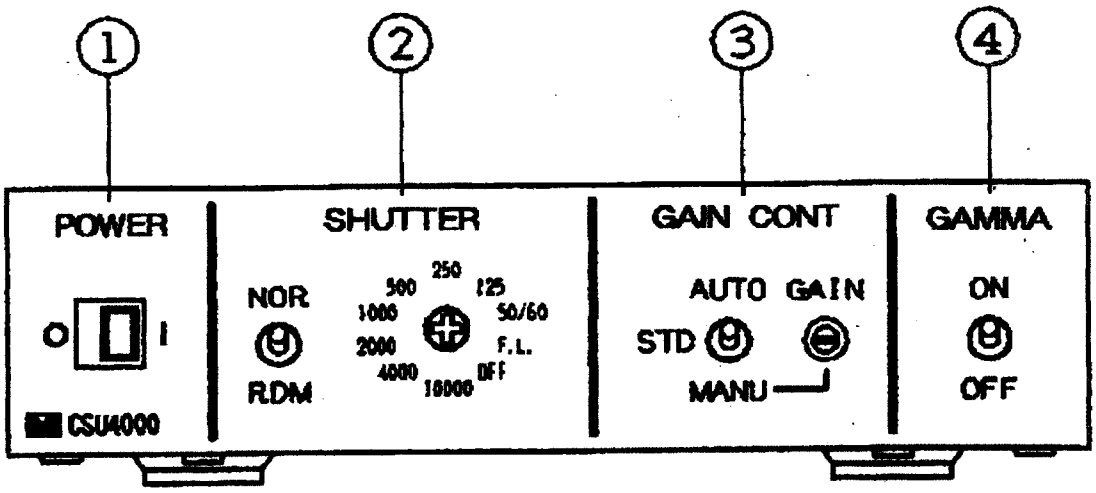
① Iris ring (Aperture ring) for use at manual operation.
To reduce aperture, rotate the iris ring toward CLOSE (clockwise).
To increase aperture, rotate the iris ring toward OPEN (counterclockwise).
Adjust the lens aperture according to the amount of light entering the lens so that correct exposure is obtained.

② Focus ring
Take the focus with the ring to get a sharpest picture.
*The CS4000 series camera is fitted with the "C" type lens mounting system using the C-mount adapter. This system allows you to use any lenses belonging to the "C" mount lens group according to your applications.

(2) Camera cable

You can use 2m, 3m or 5m cable without any adjustments. Do not use any other length of the camera cable.

(3) Camera control unit (front panel)



①[POWER]

A power on/off switch when power is turned on, the pilot lamp on the power switch will light.

②[SHUTTER]

a) Toggle switch .
[NOR]: Normal mode.
[RDMJ: Random trigger shutter mode.

b) Rotary switch
This switch is shutter speed selector

	Shutter speed	
	Normal mode	RTS mode
[OFF]	:off	1/60 sec.
[F.L.]	:1/100 sec.	1/100 sec.
[50/60]	:1/60 sec.	1/60 sec.
[125]	:1/125 sec.	1/125 sec.
[2503	:1/250 sec.	1/250 sec.
[500]	:1/500 sec.	1/500 sec.
[1000]	:1/1,040 sec.	1/1,000 sec.
[2000]	:1/2,000 sec.	1/2,000 sec.
[4000]	:1/4,000 sec.	1/4,000 sec.
[10000]	:1/10,000 sec.	1/10,000 sec.

③[GAIN CONT]

a) AUTO
When AGC (Automatic Cain Control) is to increase or decrease sensitivity electrically to get the comfortable video level.

b) STD
Normally, put it [STD] position. The gain is fixed.(0dB)

c) MANU
If the illumination of the subject is not sufficient and the picture on the monitor is dark or bright, set this switch to [MANU] position. And you can adjust the video level with the knob of [GAIN].

④[GAMMA]

Generally, TV camera provides gamma correction in the video-process amplifiers, which make up apposite side for non linear characteristics of image signals based on CRT's electron gun in TV receiver and the total performances of the video system have linear (GAMMA: 1.0).

Usually, use the gamma correction " ON " position, which set the standard camera gamma-value of 0.45.

And if required gamma " OFF " (gamma value: 1.0) with the system, turn it to " OFF " position.

8. SUPPLEMENTAL INFORMATIONS

(1) Illuminant for better picture

(2) Smear

When the strong light hits the CCD image sensor, the image of bands in vertical direction tray appear above and under the spot. This is called smear. Especially if the camera shoots under the noon sun or its reflections, a candlelight in the dark, or headlights of cars, these smears may stand out in the picture.

The CCD used in the CS4000 series is designed as very strong against the smear.

However, you may watch out for smear when shooting involves very strong light sources.

(3) Lenses

Generally, there are many kind of lenses for the video camera on the market, for example, different aperture (iris), different focal distance, zoom lenses and so on. Those having a shorter fool distance are called “wide-angle” lenses, and those having a longer focal distance are called “telephoto”.

Lenses of different focal distances have special characteristics and you can take advantage of these in shooting.

Anyhow, make choice of the most appropriate lens for your application or system.

9. TROUBLE-SHOOTING GUIDE

What may initially appear to be trouble is not always a real problem. Make sure first according to the following table before requesting service.

Symptoms	Check points
Power No power is supplied	*Have you connected power cord correctly ?
Halation or black-out occurs	*Check whether the iris ring has accidentally moved out of the normal position.

10. SPECIFICATIONS

(1)	TV system		EIA
(2)	Image sensor		Interline CCD
	①Active pixel		768(H) x 494(V)
	②Active image area		
	a) 1/2 inches		6.45mm(H) x 4.84mm(V)
	b) 1/3 inches		4.88mm(H) x 3.66mm(V)
(3)	Number of scanning lines		525 lines
(4)	Scanning system		2 : 1 interlace
(5)	Sync. System		Internal / External
(6)	Scanning frequencies		
	① Horizontal drive		15.734 kHz
	② Vertical drive		59.94 Hz
(7)	Aspect ratio		4 : 3
(8)	Illumination		
	① Standard (F11, 3,000K, 100%output)		
	a) 1/2 inches(CSH4200)		1,200 lx
	b) 1/2 inches(others)		800 lx
	c) 1/3 inches		1,500 lx
	②50% Output (F1.4, 3,000K, γ :ON,AGC:AUTO, approx. 50%output)		
	a) 1/2 inches(CSH4200)		2.5 lx
	b) 1/2 inches(others)		1.7 lx
	c) 1/3 inches		3.0 lx
	③ Minimum (F1.4, 3,000K, γ ON, AGC:AUTO, approx. 25%output)		
	a) 1/2 inches(CSH4200)		1.5 lx
	b) 1/2 inches(others)		1.0 lx
	c) 1/3 inches		2.0 lx
(9)	Video output		VS=1.0 Vp-p/75 Ω,positive polarity
(10)	Resolution		
	①Horizontal		570 TV lines
	②Vertical		350 TV lines
(11)	S/N (luminance)		50 dBp-p/rms or more
(12)	External sync. Input	HD	4±2Vp-p/High impedance, negative polarity 15.734kHz±1%
		VD	4±2Vp-p/High impedance, negative polarity 59.94Hz±1%
		SYNC	2±1Vp-p/75 Ω, negative polarity Horizontal: 15.734kHz±1% Vertical: 59.94Hz±1%
		VS	1.0Vp-p/75 Ω, positive polarity Horizontal: 15.734kHz±1% Vertical: 59.94Hz±1%
(13)	Signal output		
	① HD		TTL level, negative polarity
	② VD		TTL level, negative polarity
	③ SYNC		TTL level, negative polarity
(14)	Gamma correction		ON(0.45) / OFF(1.0) selectable
(15)	Gain control		AUTO/STD/MANU Video level can be adjustable by [GAIN] potentiometer when MANU.

(16)	Electronic shutter	Shutter speed: 10 position OFF F.L(1/100 second) 1/60 selectable 1/125 selectable 1/250 selectable 1/500 selectable 1/1,000 selectable 1/2,000 selectable 1/4,000 selectable 1/10,000 selectable
(17)	Random trigger shutter	
	① Trigger pulse input	TTL level, Down edge
	② Shutter speed	Fixed at selected speed of electronic shutter
	③ Video signal output field	Odd field feed
	④ Index pulse output	TTL level, effect of positive polarity
(18)	Power source	DC 12V±10%
(19)	Power consumption	approx. 400mA
(20)	Ambient condition	
	① Temperature	0~+40°C
	②Humidity	10~90%Rh
(21)	Camera cable	2m/3m/5m
(22)	Dimensions	refer to the apperances
(23)	Weight	
	① Camera head	
	a) CSH4200	approx. 16 gr.
	b) CSH4220	approx. 45 gr.
	c) CSH4300	approx. 11 gr.
	d) CSH4310	approx. 15 gr.
	e) CSH4400	approx. 9 gr.
	f) CSH4410	approx. 15 gr.
	②Camera control unit	
	a) CSU4000	approx 600 gr.
(24)	Emission	VCCI Class A

Design and specifications subject to chop without notice.

11. MAINTENANCE

(1) Cleaning should be done only after units have been disconnected.

(2) When the cabinet is dusty, clean by gently wiping with a soft cloth.
And avoid the use of strong cleaning agents such as benzene or alcohol as they may damage the cabinet.

(3) If malfunctioning occurs, stop using equipment immediately and consult TELI-service shop, the dealer purchased from or qualified personnel.

(4) Upon completion of any service or repairs, request the service technicians that only Factory Authorized
Replacement Parts that have the same characteristics as the original part's were used, and that routine safety checks have been performed to determine that the video product is in safe operating condition.
Unauthorized parts may result in fire, electrical shock, or other hazards.

(5) When you send the product to a service center, you must use the original carton box and packing materials, then insert the original carton box containing the unit into another carton, using more packing materials.

(6) When requesting services, the following information is necessary.
Your name, address and telephone number.
Model name, serial number and date of purchase.
Explain the damage, malfunction or other symptoms as precisely as possible.

(7) The minimum availability period for repairs (parts necessary to keep unit functioning) is 8 years after the end of producing the model.

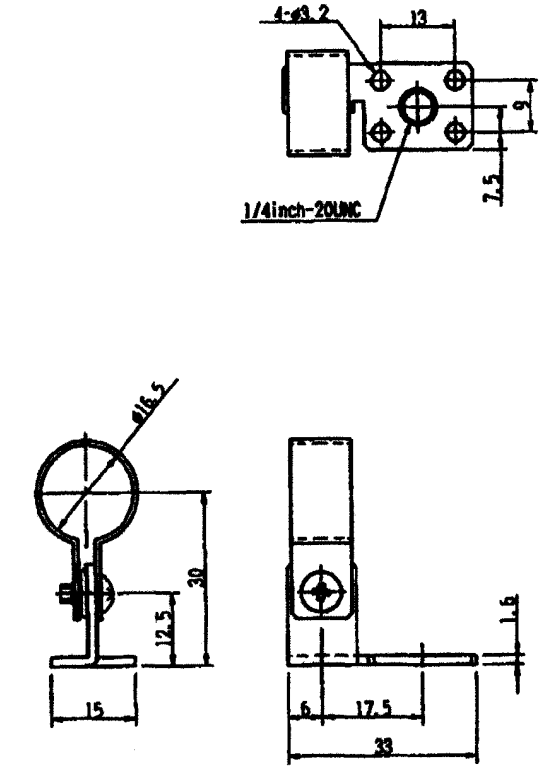
(8) If you have any question regarding after-sales service, etc., please contact the nearest service center.

12. APPEARANCES

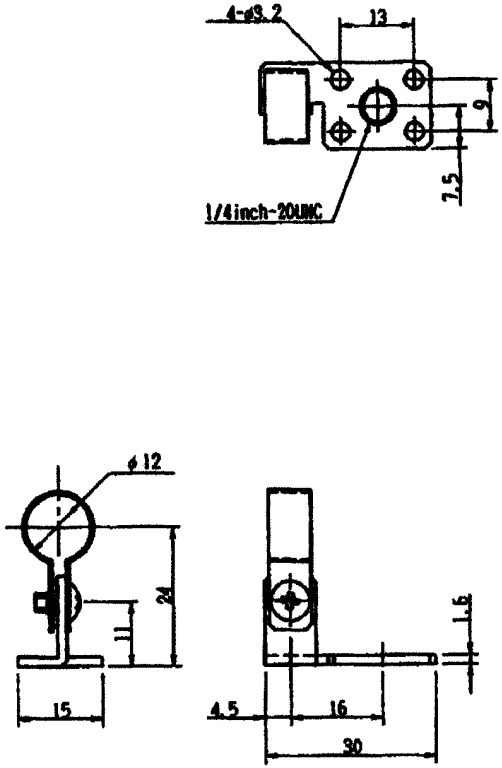
See page 18 ~ 21.

[CAMERA MOUNTING KIT (OPTION) APPERANCE]

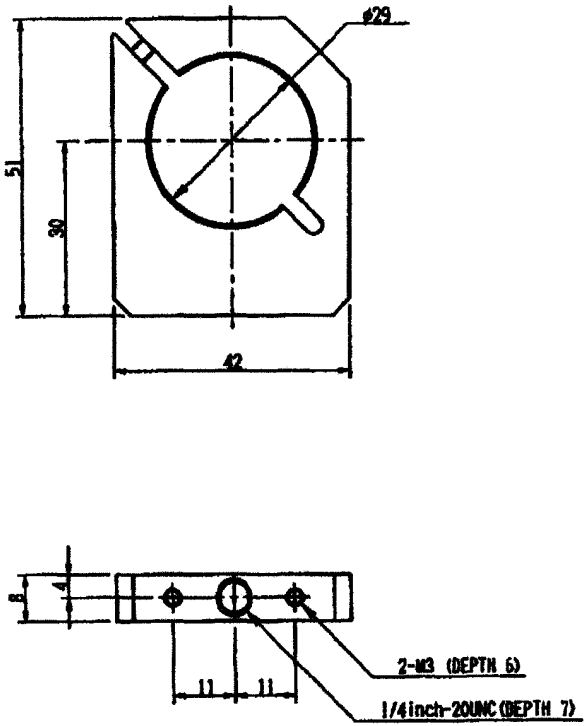
CS4200C



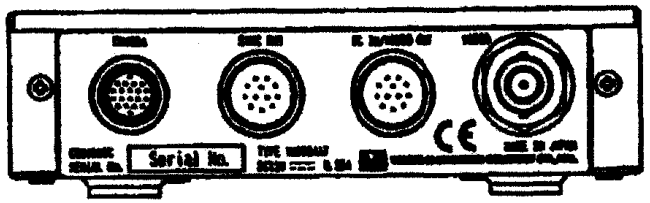
CS4300C



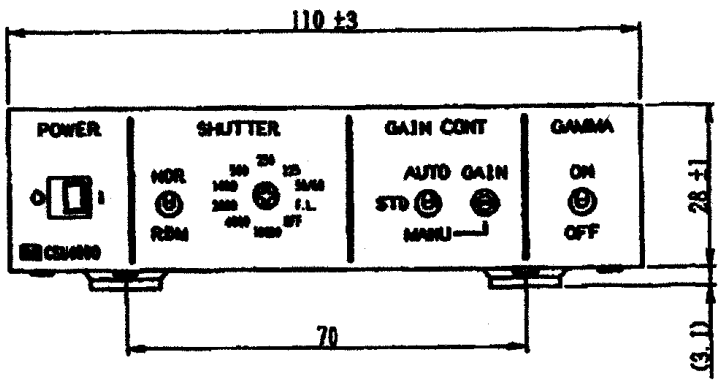
CS4220C

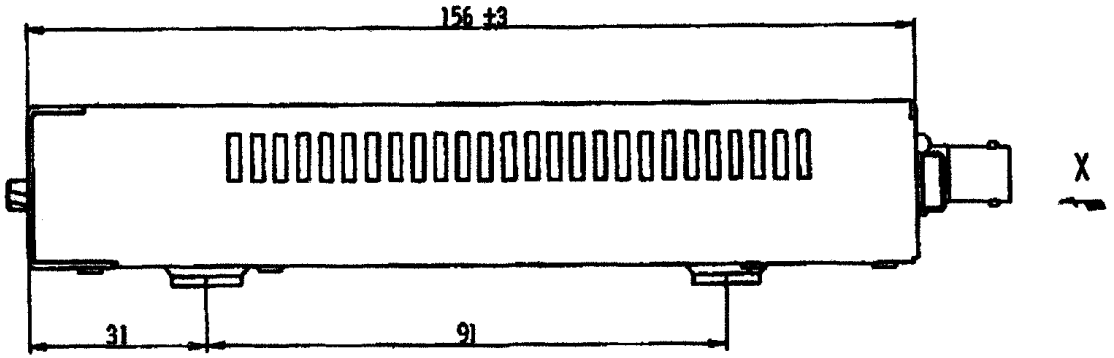


[CAMERA CONTROL UNIT APPERANCE]



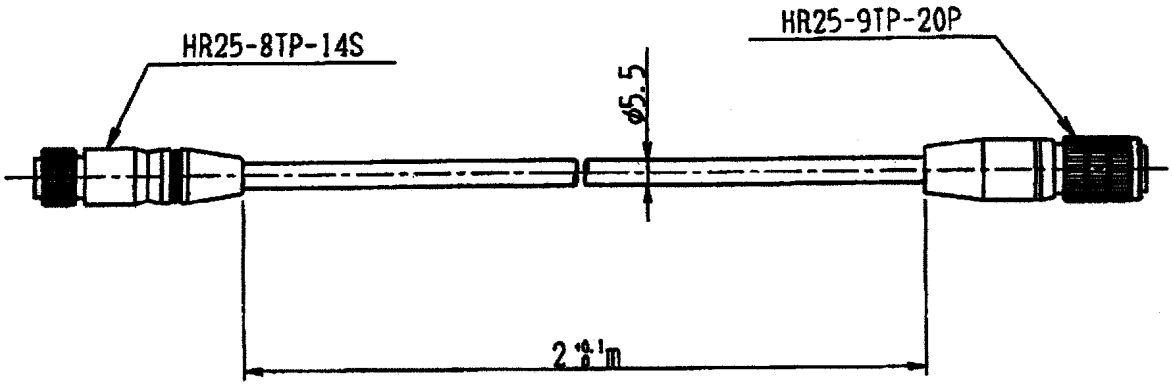
VIEW X



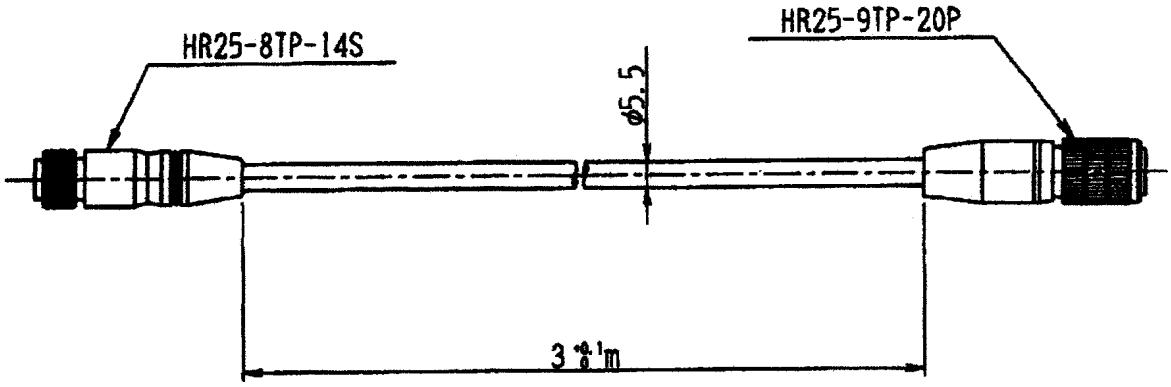


[CAMERA CABLE (OPTION) APPEARANCE]

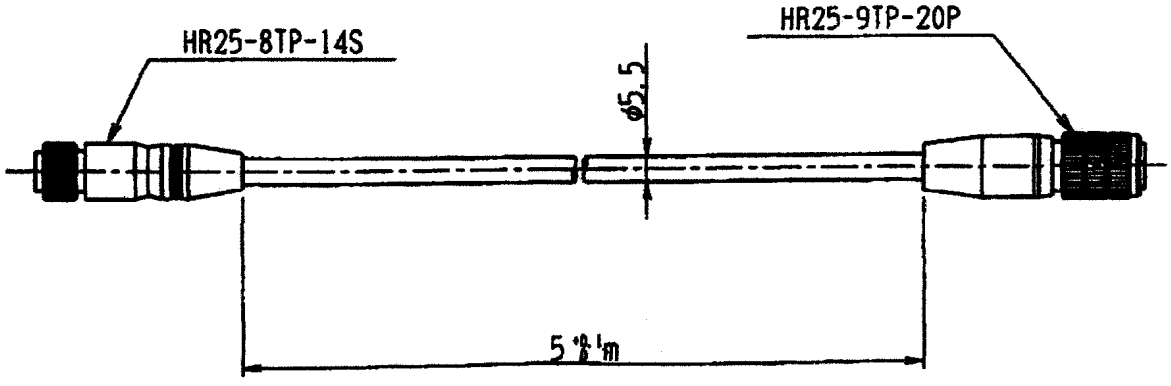
CPRC4000-02



CPRC4000-03

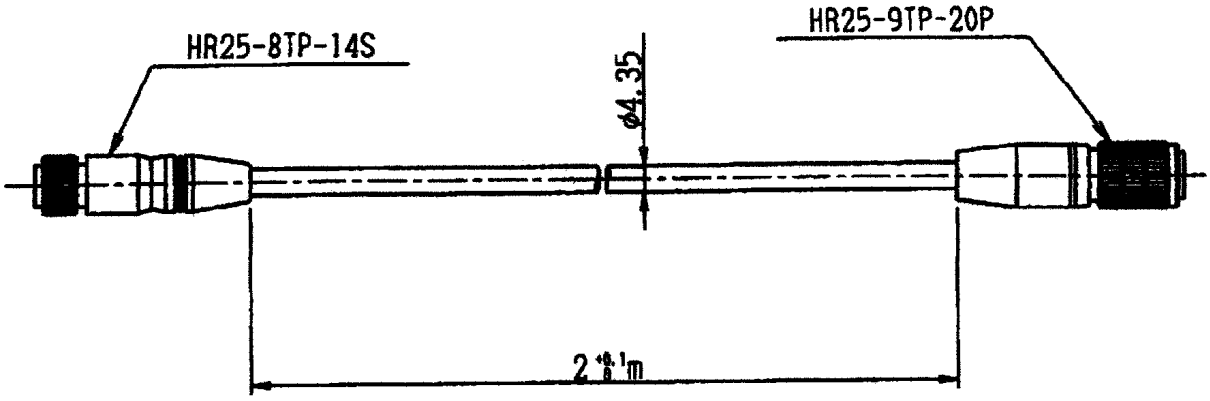


CPRC4000-05

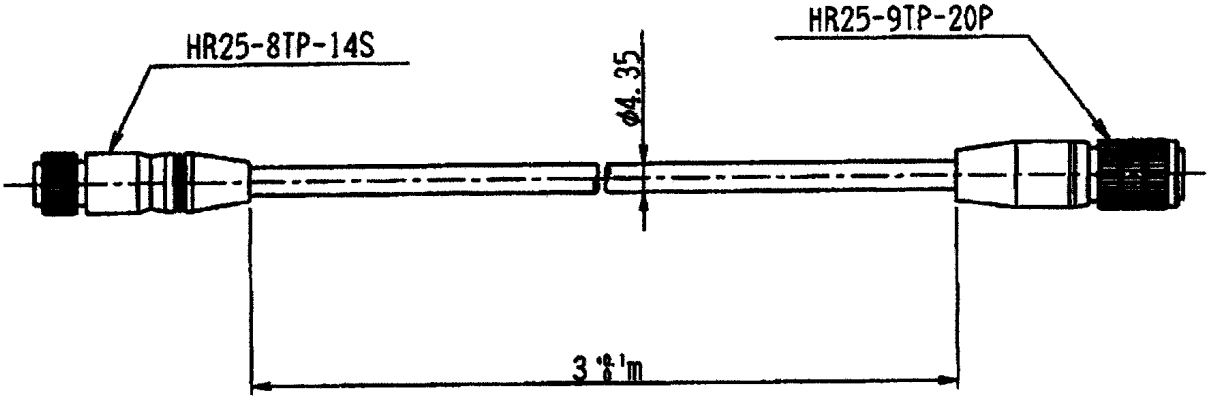


CAMERA CABLE (OPTION) APPEARANCE

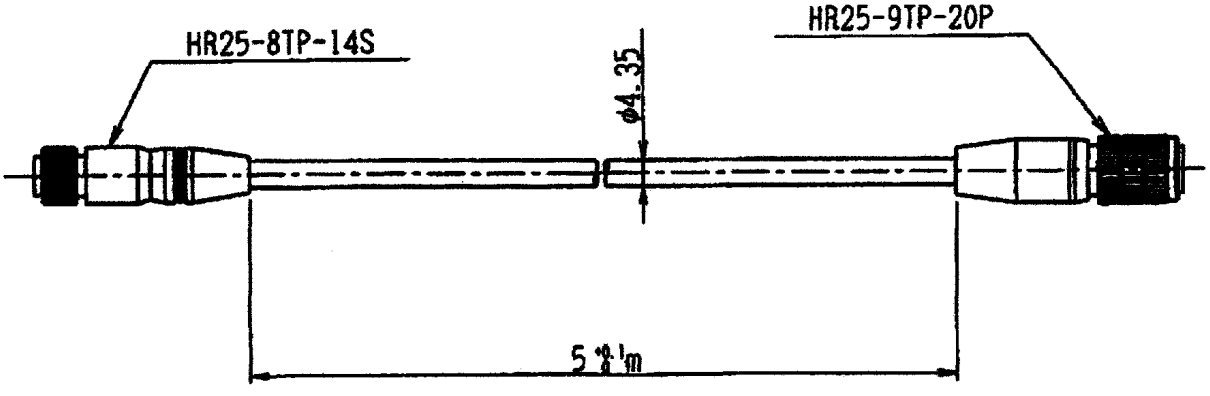
CPC4100-02



CPC4100-03

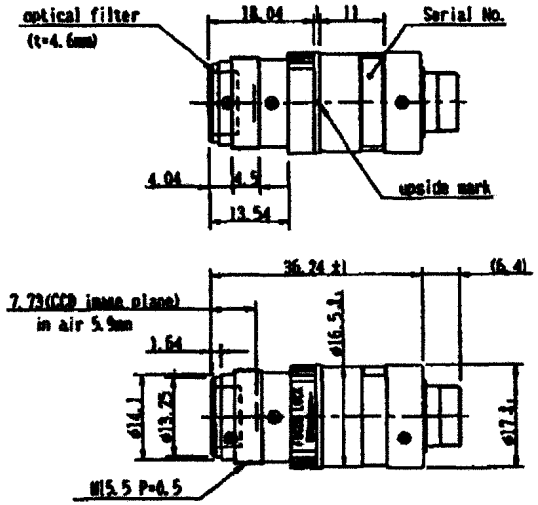


CPC4100-05

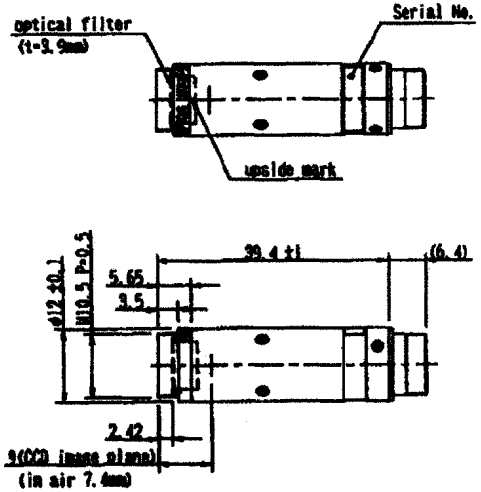


[CAMERA HEAD APPERANCE]

CS4200C



CS4300C



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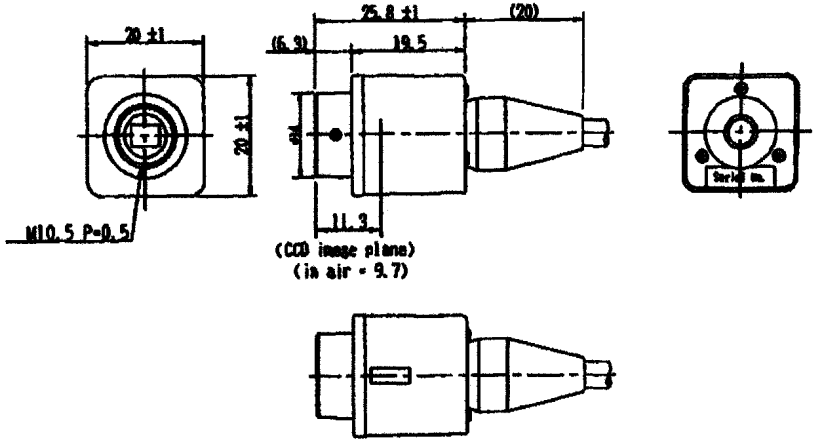

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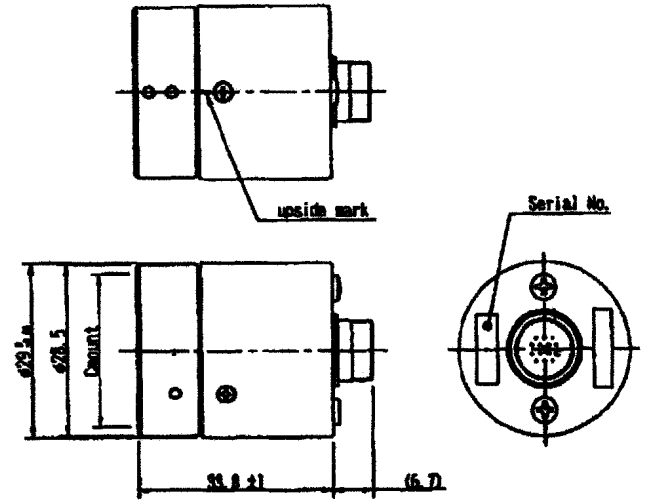

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